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Methodology, and the Statistician's Responsibility for Both Accuracy and Relevance

JOHN W. TUKEY

Princeton University [1] and Bell Laboratories

The theme of this meeting is statistics in the service of policy, public or private. If we are to serve policy, we must be responsive to its needs—often to something between its true needs and its perceived needs. This loads us down with a variety of responsibilities that we may not like, including a responsibility for understanding what policy needs really are.

I would have liked to sprinkle this talk with concrete examples where the statistical machine has chosen to measure what is easy to measure rather than what would be more helpful, even though it cannot yet be measured well. But I spend my time too far from the fray, either in Government or in Business, to have a good list. So I will have to concentrate on some general points, tied closely to methodology.

That we have failed to measure things that would be more useful because the measurement would be inaccurate is, I believe, beyond question. Even in the halls of this meeting, a friend heard a discussion summarizable as "it's possible to do it right, but it will take years, so let's hang fire till then." This may have been the correct conclusion, but it could not have been known to be without two other assessments: How urgent is the policy need for this measurement? How well would a poor measurement serve policy needs? These I believe were missing in this instance, as they so often have been. We cannot afford an ivory tower attitude, an attitude that "we don't want to try to measure anything where we cannot be proud of the measurement process."

Such a spirit can produce good measurement. But when the right thing can only be measured poorly, it tends to cause the wrong thing to be measured, only because it can be measured well. And it is often much worse to have good measurement of the wrong thing —especially when, as is so often the case, the wrong thing will IN FACT be used as an indicator of the right thing—than to have poor measurements of the right thing.

Differences

LEVEL OR CHANGE

The clearest example I know of where our profession has frequently resisted using its knowledge consists of all the economic series where change is more important than level—and what economic series is there for which this is not the case? If you tell those who do not know what the unemployment rate is today that in 1980 it will be 6.5%, they will not know whether to be sad or glad. If you tell them it will be 1% or 2% or 3% less than today, they will know how they want to react.

Our profession has given technical attention to the measurement of change. Our unemployment estimates come from samples where a household appears over adjacent months and then about a year later. We could do much more of this, and go even farther. Occasionally, we do.

But any discussion of focussing our measurement on change, something we have the technology to do, runs into the argument that concentrating on change means a weakening of our measurements of level, means a possibility of drift, means a possibility—horrors—of having to make a publicly visible adjustment—a correction.

The essence of this argument is clear. We shall not measure what is most useful, because then the sampling error, which all professionals know is there, might have to be revealed to the world.

This is a sad argument—it might even be taken to be a resort to professional pride rather than national need as a criterion. I know my colleagues too well to

[1] Prepared in part in connection with research at Princeton University sponsored by the Office of Naval Research. This talk was given as a General Methodology Lecture at the annual meeting of the American Statistical Association in Atlanta, Georgia, August 1975.

believe that this is the whole story—there are real dangers in giving better values that look worse—but that such an explanation can even be contemplated is not an occasion for pride.

TWO-PERIOD PANELS

Let us look at an oversimplified case, where technology and issues are both clear. Suppose that we are estimating something—those who wish may think of unemployment—every month, and that every sample unit is included in exactly 2 adjacent months—there is the oversimplification.

In month i, then we have results

$$Y_{iB} \text{ and } Y_{iF}.$$

The former for exactly those sample units that gave $Y_{(i-1)F}$ and the latter for exactly those sample units that will give $Y_{(i+1)B}$. To assess the series in month i, the best we can do ought to be

$$\frac{1}{2}(Y_{iB} + Y_{iF}).$$

And what of the change from $i-1$ to i? The two bases upon which we can assess this change are

$$Y_{iB} - Y_{(i-1)F}$$

and

$$Y_{iF} - Y_{(i-1)B}$$

the first of which involves exactly the same sample units, while the second involves sample units that appear only once during the two months. Their variances will be in the ratio of $1-r$ to 1, where r measures the correlation for one sample unit from one month to another, which may easily be as large as 0.9.

Thus the best current measure of change is

$$\frac{(Y_{iB} - Y_{(i-1)F}) + (1-r)\ (Y_{iF} - Y_{(i-1)B})}{2-r}$$

with variance proportional to

$$\frac{1^2(1-r) + (1-r)^2 1}{(2-r)^2} = \frac{1-r}{2-r}$$

as compared with the variance, proportional to

$$\frac{1-r+1}{2^2} = \frac{1}{2} - \frac{r}{4}$$

of the difference of the best individual values.

For $r = .9$, a large but not staggering value, these variances are in the ratio of 3.07 to 1, for $r = .5$, surely quite moderate, the ratio is 1.12 to 1. How large differences in quality are we prepared to accept—if their only purpose is to maintain an appearance of consistency?

A POSSIBLE CONSEQUENCE

What if we focus on change, month after month, and link the changes together? If we sum

$$\frac{(Y_{2B} - Y_{1F}) + (1-r)\ (Y_{2F} - Y_{1B})}{2-r}$$

$$\frac{(Y_{3B} - Y_{2F}) + (1-r)\ (Y_{3F} - Y_{2B})}{2-r}$$

$$\frac{(Y_{4B} - Y_{3F}) + (1-r)\ (Y_{4F} - Y_{3B})}{2-r}$$

$$\frac{(Y_{5B} - Y_{4F}) + (1-r)\ (Y_{5F} - Y_{4B})}{2-r}$$

we get

$$\frac{(Y_{5B} - Y_{1F}) + (1-r)\ (Y_{5F} - Y_{1B})}{2-r}$$

PLUS intermediate terms, specifically

$$\frac{r}{2-r}(Y_{4B} - Y_{4F} + Y_{3B} - Y_{3F} + Y_{2B} - Y_{2F}).$$

As we add more and more changes, the list of intermediate terms gets longer and longer, and hence more and more variable.

As a result the sum—base value PLUS all monthly changes to date—tends to drift. Sooner or later the difference of current best estimates becomes better. Summation of changes over many periods is not the way to get accurate levels.

LEAST SQUARES

Some of you will wonder how such things can be—at least if least squares are used—because they will recognize that, under least squares, the best estimate of any linear combination is the same linear combination of the best estimates of the components. Is this a paradox?

Not at all, for we are not in the convenient least squares paradigm:

—get all the data first,

—then analyze it.

We have to report on this month, before next and later months are in. As more data accumulates, the least squares solution for past months changes. If we were wholly free to readjust past months, there would be no conflict between measuring change and measuring level, at least for least squares (if the occurrence of outliers is weak enough to make least squares tolerable).

IN AN IDEAL WORLD

In an ideal world, what should we do? It seems to me that we ought to teach all those who respond to our economic series a simple and difficult lesson: The best estimate of change is often not the change in the current best estimates. In particular it may be that the best estimate last month was 111, this month 114, yet the best estimate of change is +2 NOT +3.

I don't know whether we can educate our consumers to the point where not only will they accept estimate of change ≠ change of estimate for themselves but they will even not be bothered by partisan political debate in which each debater focuses on the side of the inequation that supports his own position. But it is not clear to me that we should not try.

In an even more ideal world, of course, we would meet the situation by saying: "Last month we reported 111, we now know that 112 is more precise, this month we report 114, corresponding to a change of +2." This, in a least squares context, would be even more precise. Would our consumers accept this? If there are only few of them it seems to me that they might.

We ought to seek out places where we dare try such reporting. We ought to learn how to say such things so that they will be accepted with the least friction and lost motion.

PRELIMINARY SERIES

More and more series, I suspect, are now appearing in preliminary and final forms. In almost every case where this happens, it would seem to me that the preliminary estimate should be calculated in the form: last period final PLUS best estimate of change and that all those concerned in gathering and working with data for the preliminary estimate should be brought to believe that their purpose was the estimate of change.

Preliminary estimates are usually a consequence of incomplete data. An emphasis on change would lead to more careful specification of what was the corresponding figure last month for each figure so far available this month and on what allowance—IN CHANGE TERMS—ought to be made for the unavailable figures. This ought to improve the preliminary figures as measures of change—the purpose for which they are almost always wanted in a hurry.

If any of you wish to accuse me of asking us to treat current information on our economy in the spirit that current information on the vote is treated on election night in projecting election results, I will not object. Election night projection is real-time statistics at its acme—the results come in before the projections are forgotten (except, in 1972, for the Senator from New Hampshire) and there is serious competition for timeliness and correctness. Economic statistics are slow real-time statistics by comparison, slowed by a factor of perhaps 50 to 100. Why should we not look to the attitudes and approaches that have been hammered out in the most competitive arena?

CLOSE

Somehow we ought to move further toward measures of change—how far we can go may have to be learned from experience—but we ought to be pushing steadily against the practical limitations. We need to measure well what is most important for policy, even if doing this makes us trouble.

I understand that this is in fact done for the current estimates of monthly retail sales, where correlations are not just .9 but are more nearly .95 or .99. Here we have been responsive to need, as we should. I wonder, however, how thoroughly the emphasis, both within the organization and in the official releases, is on change for the preliminary and on bench-marking a level for the final.

Some of my friends who know Washington bureaucracy from the inside feel that I have been more than a little unrealistic in this discussion, saying that people get promoted in the bureaucracy for NOT making mistakes, that the difference between imprecision and inaccuracy is not recognized, so that absence of precision is taken as inaccuracy and failure, and that admission of imprecision is incredibly dangerous in what is essentially an adversary process.

They go on to say that we must remember how unpopular facts are when they oppose a politician's opinion, and that, given the various attempts of not many years ago to subvert the federal statistical process, the real problem may be our failure to visualize a strategy for making more effectively available the achievable information without imperiling either individual careers or the reputation of the Federal statistical process.

Standardization

Let me now turn to a quite different area, to a different sort of statistical technique applied, for the most part, to a different sort of data. The most used

statistical technique to which most academic statisticians have given little attention is standardization.

I believe it is time for all of us to think a little more about this subject, especially about the aspects that have received least attention.

Let me outline two examples:

—standardization of death rates as in each year's Vital Statistics of the United States.

—standardization of death rates following surgery, say by hospital, as in the National Halothane Study.[2]

A SIMPLE EXAMPLE

In the first example, if death rates are to be reasonably comparable from year to year, we must take account of the changing age structure of the population. A simple way to begin this for white males, for instance, is to use estimated current population, in ten-year age bands, and enumerated current deaths, in the same bands, to calculate apparent death rates for each ten-year band. If we then take a standard distribution of white males over these bands—as of the 1970 Vital Statistics publication, the U.S. 1940 population was taken as standard—we can combine these age-band death rates to an overall standardized death rate.

Clearly, such a procedure improves comparability.

Equally clearly, it does not tell the whole story.

Death rates are not, of course, constant at one value from age 50 to age 59—and at another from age 60 to age 69. There are changes within 10-year bands. If the distribution of ages within a 10-year band changes, the age-band death rate changes, even if the death rates for each detailed age remain the same.

We have adjusted—as we almost always do—for broad categories, without going on to make an, at least plausible, further adjustment for the fact that the categories are not narrow. This is something we can do better if we wish.[3] Why don't we?

It may well be that the additional corrections would be small. When this is so, however, we need to know that it is so. Either we should get further adjusted figures, with a statement that further adjustments were all small, or we should get initially-adjusted figures with a statement about how large the further adjustments would be—at least for an honest sample of the figures given. Only thus can we be sure that, when the additional adjustments are not small, we will know it and have a chance of having adequately adjusted figures.

My concern here is not really with the national age-adjusted death rate, something that may well deserve rather more attention that it gets. My concern is directed more toward the more detailed comparisons that are now becoming available, such as the National Cancer Institute's mammoth work[4] which gives 1950-1969 age-adjusted death rates for 34 cancer sites for every county in the United States—by sex and color. This is a large labor, offering us much raw material for analysis, but I cannot help wondering how much difference would be made—at least in some cases—by further adjustment for broad categories. If we are to disentangle the messages of geographic differences in cancer death rates, we are likely to have to face such questions.

The only two reasons confining oneself to simple age-adjustment seem to be

—it is less work,

—it requires no VISIBLE assumptions.

In this era of the computer, the first seems hardly enough. And the second, as we may recognize, is purely a matter of visibility, not truth.

If we ask what is required for simple age adjustment to be satisfactory, the answer is "nearly enough constant shape of distribution of ages in each band separately." Yet who explains this when talking of age standardization? As long as we do not tell this truth, age adjustment seems so simple and obviously true—let us not rock the boat.

At least in professional circles, there ought to be clear ideas of how large—and how geographically systematic—the effects of further age adjustment might be. (Consider Pinellas County, Florida with its high concentration of retirees. Is its distribution of ages between 60 and 65, or between 65 and 70 similar to more typical counties? Who knows off-hand?)

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[2] *The National Halothane Study* 1969 (ed. J. P. Bunker, W. H. Forrest, F. Mosteller, L. D. Vandam) National Institutes of Health, U.S. Government Printing Office, Washington, D.C.

[3] See, for example, Chapter II of F. Mosteller and J.W. Tukey, *Data Analysis and Regression: a Second Course in Statistics.* Addison-Wesley, Reading, Massachusetts, 1977.

[4] (tables) T. J. Mason, F. W. MacKay, *Cancer Mortality by County; 1950-1969.* (DHEW Publication No. (NIH) 74-615), National Cancer Institute, U.S. Department of Health, Education, and Welfare, 1973.

(patch maps) T. J. Mason, F. W. MacKay, R. Hoover, W. J. Blot, J. F. Fraumeni, Jr., *Atlas of Cancer Mortality for U.S. Counties: 1950-1960.* (DHEW Publication No. (NIH) 75-780, National Cancer Institute, U.S. Department of Health, Education, and Welfare, 1975.

DEATH CERTIFICATES

Given the rise of deaths from possibly delayed causes—and the precipitous fall in deaths from immediate causes, including infectious disease—is it not time to reconsider what location information we try to get on the standard death dertificate? To ask for more information is to raise new problems of incompleteness, but again perhaps we should face difficulties in the hope of better answers.

One guess as to what we might best add is information on the deceased's residence at one or more earlier periods, perhaps 5, 10 or 20 years before death. Without something of this sort, and given the mobility of our population, I find it hard to see how we can extract vital information about the effects of environmental exposure—or even the effects of geographic differences in health care—from our death certificates.

Yet today these are the basic issues, these, not the impact of infectious disease, are the reasons why a death registration system might effectively support public policy in the decades ahead.

Again it will be a harder job to bring measurement closer to policy. Again much wisdom is needed to consider the alternative routes by which we might begin to gather such data.

A MORE COMPLEX EXAMPLE

One aim of the National Halothane Study was to compare the rates of death during 60 days after surgery for operations carried out under various kinds of anesthetic. The study was initiated by suspicions of a widely used anesthetic called halothane. Toward the end of the study, one statistician conveyed his understanding of the data to a committee mainly composed of anesthesiologists by asserting that he would not let any of his immediate family be operated on without a signed paper saying that halothane WOULD be used. While that was perhaps an overreaction, I would not like any of you to go away with a negative feeling about halothane. Today, the medical professions seem, to statisticians, to have a reasonable view of the pros and cons of halothane. Now for the statistical issues.

When one started to compare death rates after operation *ceteris paribus* there were many *ceteris* including:

—type of operation,

—age and sex of patient,

—physical status of patient,

—length of operation.

It was clearly desirable to standardize for all these things together. One difficulty was obvious, if we divided the cases into cells in accordance with even a moderately fine classification on these variates there would be more cells than deaths—and since there were only 800,000 cases in the retrospective study, there could even be more cells than cases. Ordinary techniques of standardization could not be used, even though age of patient was in 10-year bands, much too wide for either effectiveness or efficiency—since, at the older ages, the death rate doubled every decade.

One cure for this problem was a technique called "smear and sweep" in which standardizing variables were introduced one at a time, each being combined with those already considered before the next was introduced. I refer you to the National Halothane Study for details, mentioning the technique here only to show that one can standardize for SUITABLY SELF-SELECTED combinations of more standardizing variables than one would think.

COMBINED AGE DEPENDENCE

If we are to work with age in blocks, there is no reason why we should look at raw death rates. If, as in the higher ages of the National Halothane Study, we have a death rate that is—even quite crudely—exponential, we can adjust our estimates of the number exposed in an age band to a mid-age, assuming a specific exponential dependence, and then adjust further, as needed, by factors for age bands. (Had we had ages in individual years, rather than decades, the precision of the National Halothane Study's results could have been appreciably increased.) Doing this sort of thing would increase the difficulty of explanation somewhat, but could make the results appreciably more precise—and often correspondingly more useful.

FURTHER ADJUSTMENT

In cases like the county-by-county cancer death rates, the possibilities of adjusting for demographic variables in addition to age, sex and color seem to me to be important. If there is an urban-rural gradient, say in the death rate, it seems to me that recognizing this fact AND removing a suitable fit, so that geographic detail is not encumbered by an easily described trend, could be very important.

The basic lesson is that

data=fit PLUS residuals

promotes understanding when BOTH fit AND residuals are examined CAREFULLY—and deserves more attention in many applications.

Taking the view that all we want to do is say "what happened" in each of 3000-odd counties is not going as far as we should go. The price of going further is more complex patterns of analysis and less simple-minded description. Let us plan to pay the price.

SUPERSTANDARDIZATION

The National Halothane Study introduced another technique. For each of 34 hospitals there were available

—a raw death rate, and

—a standardized death rate,

whose ratio

$$\text{SMR} = \frac{\text{raw death rate}}{\text{standardized death rate}}$$

indicated how much adjustment to the raw death rate for that hospital was accounted for by standard, rather study (except for smear and sweep) methods of standardization. A plot of

log standardized death rate
AGAINST
log SMR

was made one afternoon (34 points, one per hospital), and a further regression, with a slope of about 0.6, manifested itself.

The question of just how to interpret such additional regressions, here

log raw death rate—constant*+1.6 log SMR

instead of

log raw death rate—constant**+ 1.0 log SMR

is not an easy one. Interpretations in different fields of application would seem likely to differ in character. But wherever such "superstandardization," in the form of such additional regression, sops up important parts of the variation, it seems important to make such a fit, and then—as always—to look hard at both the fit and the residuals.

Suppose we find that, when standardizing for age, there is additional regression on relative age, however expressed. We need to ask ourselves carefully why counties with older populations, for instance, behave older—or younger—than they are—and we need to exclude this additional regression before looking at geography.

CLOSE

What have we been asking for in connection with standardization? Mainly three things:

—facing up to corrections for adjustment by broad categories.

—flexibility in using such devices as combined age adjustment or smear and sweep.

—empiricism in using either external variables (perhaps demographic, perhaps economic, perhaps ?) or superstandardization in moving toward a

fit PLUS residuals

stance, with both being examined carefully.

Each of these comes down to recognizing complexity in the world, to making results somewhat harder to explain but, also, hopefully, to making much larger increases in the usefulness of the results.

A Few Individual Points

THE PHILLIPS CURVE

Economists have shown increasing interest in the "Phillips curve" the believed-in relation between unemployment and rate of inflation—a relation that is believed by some to have so shifted that a given inflation rate is now consistent with a higher level of unemployment. Is this shift a change in structure—or is it just our failure to measure the discomfort of unemployment—rather than its rate?

Unemployment insurance is only one of the mechanisms that makes unemployment less painful to individuals and households that it would have been 45 years ago. If we could measure what fraction of the people were hurt, to a given degree, by their unemployment, we might find the comparison across decades quite different than if we measure only how many are unemployed.

Might it not be that the real relation is between pain of unemployment and rate of inflation? And if this is indeed so, what are the policy consequences? Who wants higher inflation? Who wants higher pain of unemployment? A very uncomfortable dilemma that we do not know whether we are in—perhaps only because we have failed to try to measure the more difficult quantity.

THERMODYNAMICS OR PHYSICAL CHEMISTRY?

To one brought up a chemist, as I was, classical economics is a clear analog of thermodynamics; it tries to tell us what will happen, but not how it will come about. The fact that a rubber band must cool off when it is stretched is easy to establish by thermodynamic arguments, but to understand the mechanism by which this really happens is a matter of molecular structure, broken bonds, physical chemistry. Just as real chemical processes are likely not to be perfectly reversible, so most markets do not involve perfect competition.

Is it not likely to be generally true that the challenges of economic measurement for the decades ahead, both for the large firm and for the nation, are the challenges of measuring characteristics of the details of the processes of re-adjustment—and not just measuring the analogs of thermodynamic quantities. The economic analog of physical chemistry, with its detailed mechanisms, may well be the problem area of the economic statisticians' future. And think how hard it will be to measure such things, particularly at first. But then plan to go ahead and measure them.

METROPOLITAN SCHOOL SYSTEMS

Measurement of individuals has long been characteristic of education at all levels, both to answer "which ones learned enough?" and, to a lesser extent; to answer "which ones learned best?" Over the last dozen years, measurement of education's product—for which the "in" word is "assessment" has been becoming more and more respectable, at national, state, and even some local levels.

The next step is presumably, the measurement of the process—something quite different from measurement of the product, especially because who knows where the product learned what he or she appears to know.

Presumably, then, the first real step toward measuring the process will be the careful longitudinal study of SAMPLES of our school children. Really extensive data on all children in a large school system is probably unmanageable for the near future—and too expensive as well. But extensive data on samples of something between 1% and 10% in a large system ought to offer us considerable insight into the process. We might someday answer such questions as: What is the relation of absenteeism and rate of improvement of performance? Does it matter whether the absence is due to sickness or playing hooky? What is the return from specific sorts of curriculum enrichment?

Any of us could design an adequate sample—quality and efficiency would of course vary with our individual experience and background. But who among us has thought long enough to have high confidence in his or her methods of measuring the things that need to be measured? Again we need to move ahead.

Patch Maps

I like displays, graphs and maps as much as the next man or woman—probably much more. But I am coming to be less and less satisfied with the sort of maps that some dignify by the name "statistical map" and that I would gladly revile with the name "patch map".

At issue is the sort of map in which each county—or each state—or each piece of some other subdivisioning—is colored or shaded to reflect its average characteristic. Thus the map, though perhaps not a collection of shreds and tatters, is a collection of patches, whose shape, size and location reflect the civil divisions or census subdivisions, whose data we have chosen to map. (See page 260 for an example.)

Undoubtedly the excuse for doing just this is again that it is simple, and no one can claim you have done anything wrong, but it is a very real question whether you have done anything right.

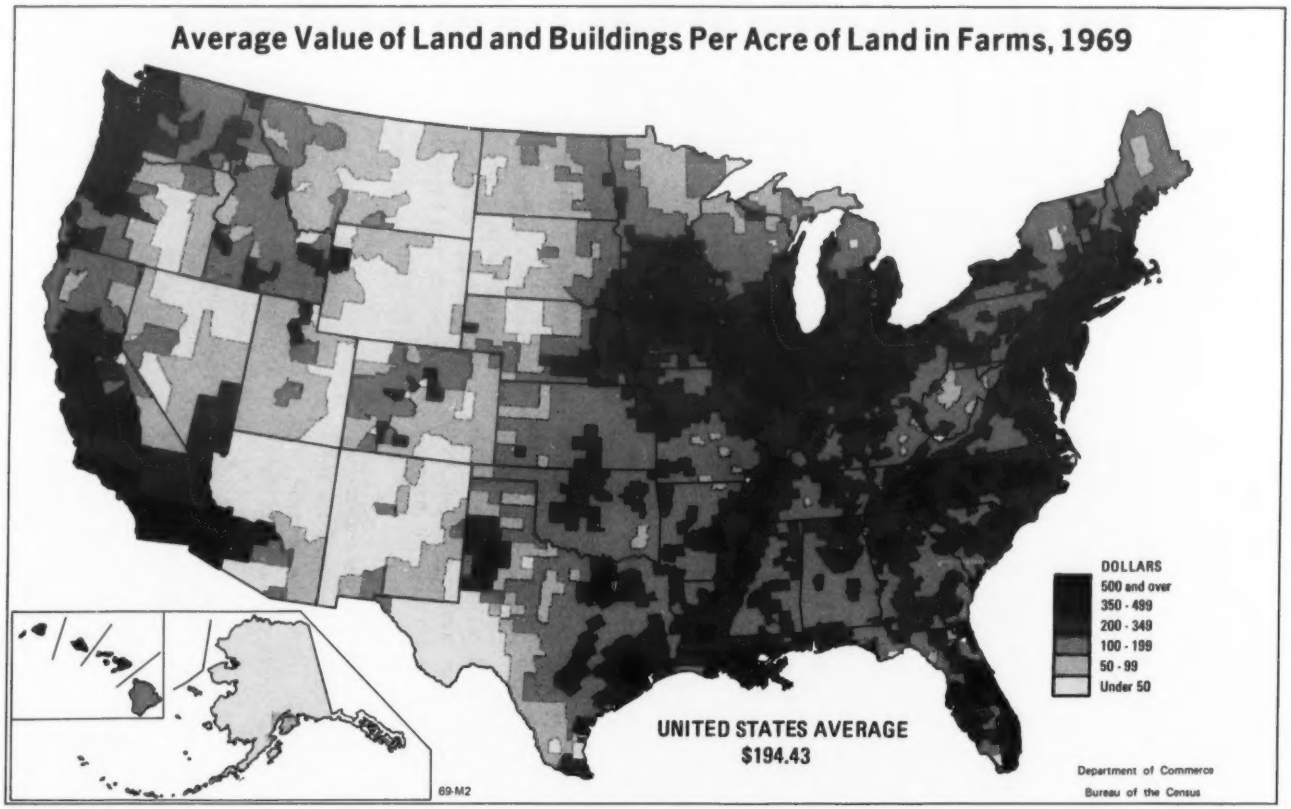
There are exceptions, of course. Thus patch maps of taxable property per head, or per school child, do reflect a common reality for all those who live in the same patch, and I am sure you can find a few others. But how many?

AN EXAMPLE:

My favorite example is Washoe county, Nevada. And since the 1962 City and County Data Book was at hand, we will see data from the 1960 Census for population and area:

Division	*1960 population*	*1960 area*	*1960 density*
Washoe county	84,743	6281	13.5
Reno	51,470	11.8	4362
Sparks	16,618	2.7	6155
Rest of County	16,655	6266.5	2.66
Adjacent counties { to	(5708)	(9702)	(.59)
Adjacent counties { NE	(3199)	(5993)	(.53)

Clearly, assigning a single population density to Washoe County is near nonsense—and the same


Average Value of Land and Buildings Per Acre of Land in Farms, 1969
DOLLARS
500 and over
350 - 499
200 - 349
100 - 199
50 - 99
Under 50
UNITED STATES AVERAGE
$194.43
69-M2
Department of Commerce
Bureau of the Census

would be true, to a somewhat lesser degree, for assigning a single value to anything that varies noticeably from urban to rural. The average population density, of 13.5 per square mile, is unrepresentative in one direction for individuals, more than 80% of whom live in places with more than 4000 per square mile—and is unrepresentative in the other direction for area, more than 97% of which averages less than 3 per square mile (and probably 90% of which has only a few tenths of a person per square mile. Adjacent Humboldt county, less the county seat of Winnemucca, has less than one-fourth of a person per square mile.)

In thinking about this example, remember that Washoe county has an 192-mile N-S border with California, and extends 170 miles north of Reno and Sparks. Only about one-third of the county's area is within 50 miles of these population centers.

This is an extreme example, but something of the same sort happens in almost every county. Mercer County, New Jersey, were I live, was 40% Trenton in 1960, yet much of the county was very far from being like Trenton. Bristol County, Massachusetts, where I was born, was more than 60% New Bedford PLUS Fall River PLUS Taunton in 1960, yet Westport, where I summer, operates effectively with Selectmen and Town Meetings. Maps of most quantities of direct interest which assign average values to the wholes of counties, thereby lie, lie, lie.

WHAT TO DO?

It is not that we are barred from taking action about such lies, for there are other things we can do. Some of them are:

—assigning county values to county centers (of population, area or what have you) rather than to county patches.

—smoothing such county-center values and contouring the resulting smooth.

—studying the dependence of the quantity that concerns us upon, perhaps, such variables as population density, population potential, and per capita income, and then examining both fit and residuals carefully. (Smoothing and contouring the residuals may really tell us something.)

In many places, and for many quantities, the Census has given us data for county divisions, cities, towns, and census tracts. We have the raw material for looking inside counties, inside large cities, etc. and we can use it to move far toward a

fit PLUS residuals

position. Once there, we can, today:

—map the raw residuals

—map the residuals shrunken for sampling variation

—map the smoothed residuals

and tomorrow we should be able to combine shrinking for sampling variation with smoothing.

Even if the Census had not been as kind to us as it has, we could move a major step toward

fit PLUS residuals

using only county data. Three thousand-odd counties are a lot. We have no need at all to stick to patch maps, we can do much better.

The story is always the same:

—somewhat more calculation

—more difficult explanation

—a little greater uncertainty

—all in all much more useful numbers and pictures.

As so often, the gain is likely to be great.

Have I Been Extreme?

Some of you may find what I have been saying very extreme. Too bad, for I have really been quite conservative. Many of you know my Harvard friend and colleague Frederick Mosteller; most of you know who he is. Some of you know how very far from being wild-eyed he is. But he asserts, and I am glad to join in his assertion, that we have a real responsibility, AS STATISTICIANS, to guess when only guessing is possible. His practical suggestions on how to learn to do such things will appear in a forthcoming book of readings and writings. I urge you to read them.

WHY?

Surely there must be reasons other than those I have suggested why we have not moved further ahead into the uncomfortable, if that is where the most valuable things are to be done. Surely there must, and I wish I could be surer what they are. Some, as we noted, are matters of organizational pressure, actual or perceived.

One largish one I can identify, I think. It relates to the use of

fit PLUS residual

as a way of life, where the fit may come wholly from the data before us, wholly from other experience (data or crystal ball), or partly from one and partly from the other.

I look upon the process of making such a separation AND then looking carefully at BOTH parts, separately (and, if it helps, together) as a standard process, empirical and exploratory in nature; as not necessarily connected with any notion of best estimation —or even any notion of estimation; as a convenience in making contact with our data, and not as something that necessarily teaches us about laws of nature or even about continuing regularities. Accordingly I am willing to try one fit in the Northeast—and another in the West; or one fit in more metropolitan counties and another in the open country. If one is willing to follow where the whole body of data leadeth, and sit loose to the meaning and constancy of one's fits, the

fit PLUS residual

approach can do much for any of us, just as the reverse attitude can get any of us in trouble.

As statisticians, we have a responsibility to recognize patterns, to make behavior describable in words, to reduce that which is left over, as far as is reasonable, to undescribable irregularity. The price of making more of what happens describable is making what is described somewhat more complicated. Not all our clients and users will be realistic enough to like this, but enough can be to nucleate understanding and spread the more realistic view.

Clearly what I have said today has drifted somewhat from what I thought I might say. Unsurprisingly enough, it has drifted toward things I understand in more detail. But the key flavor is the same:

If what is really needed is harder to measure or harder to explain, we still need to measure and explain it.

And my deep conviction that we are failing to measure important things, either because of pride in our measurement techniques or because of fear of imprecision being interpreted as error, is undisturbed and evergrowing. To refuse to try to measure something because there is no good frame can easily be "hubris", the kind of pride that leads to a fall. If too many of us are too proud of our measurement techniques, or show the wrong degree of bravery in reporting, we may all fall together.

CURRENT DEVELOPMENTS

STATISTICS FOR AMERICANS OF SPANISH ORIGIN OR DESCENT

On June 16, 1976, joint resolution was signed into law (Public Law 94-311) relating to the publication of economic and social statistics for Americans of Spanish origin or descent. The Statistical Policy Division of OMB will convene a meeting in September of the major statistical agencies to discuss the implementation of the law. This meeting is a first step in response to Section 3 of the law, which requires the Director of the Office of Management and Budget to develop in cooperation with the heads of Federal statistical agencies "a government-wide program for the collection, analysis, and publication of data with respect to Americans of Spanish origin or descent."

In signing H.J. Res. 92 into law, President Ford stated:

"I am pleased to be signing today H.J. Res. 92, a measure which empasizes the need for a sound program of Federal statistics regarding the millions of Americans of Spanish origin or descent.

"As stated in the preamble to this Joint Resolution, Spanish-origin Americans have made significant contributions to enrich American society and have served our Nation well in time of war and peace. To encourage and assist their full participation in all aspects of American life, it is important that we have adequate and accurate information about their economic and social conditions.

"Such information, gathered through the major statistical programs of the Federal Government, can help provide the basis for action on the part of governments at all levels—Federal, State, and local. In addition, action by private organizations can better

assist Americans of Spanish origin and descent in achieving a better life.

"The major Federal statistical agencies already gather and publish much of the data required for determining the conditions and needs of this often disadvantaged group. And these agencies have made significant improvements in their efforts to help assure that such needed information is available.

"I applaud these efforts and the increased impetus they will receive as a result of the enactment of H.J. Res. 92."

The text of Public Law 94-311 follows:

Whereas more than twelve million Americans identify themselves as being of Spanish-speaking background and trace their origin or descent from Mexico, Puerto Rico, Cuba, Central and South America, and other Spanish-speaking countries; and

Whereas these Americans of Spanish origin or descent have made significant contributions to enrich American society and have served their Nation well in time of war and peace; and

Whereas a large number of Americans of Spanish origin or descent suffer from racial, social, economic, and political discrimination and are denied the basic opportunities they deserve as American citizens and which would enable them to begin to lift themselves out of the poverty they now endure; and

Whereas improved evaluation of the economic and social status of Americans of Spanish origin or descent will assist State and Federal Governments and private organizations in the accurate determination of the urgent and special needs of Americans of Spanish origin or descent; and

Whereas the provision and commitment of State, Federal, and private resources can only occur when there is an accurate and precise assessment of need; Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Department of Labor, in cooperation with the Department of Commerce, shall develop methods for improving and expanding the collection, analysis, and publication of unemployment data relating to Americans of Spanish origin or descent.

SEC. 2. The Department of Commerce, the Department of Labor, the Department of Health, Education, and Welfare, and the Department of Agriculture shall each collect, and publish regularly, statistics which indicate the social, health, and economic condition of Americans of Spanish origin or descent.

SEC. 3 The Director of the Office of Management and Budget, in cooperation with the Secretary of Commerce and with the heads of other data-gathering Federal agencies, shall develop a Government-wide program for the collection, analysis, and publication of data with respect to Americans of Spanish origin or descent.

SEC. 4. The Department of Commerce, in cooperation with appropriate Federal, State and local agencies and various population study groups and experts shall immediately undertake a study to determine what steps would be necessary for developing creditable estimates of undercounts of Americans of Spanish origin or descent in future censuses.

SEC. 5. The Secretary of Commerce shall ensure that, in the Bureau of the Census data-collection activities, the needs and concerns of the Spanish-origin population are given full recognition through the use of Spanish language questionnaires, bilingual enumerators, and other such methods as deemed appropriate by the Secretary.

SEC. 6. The Department of Commerce shall implement an affirmative action program within the Bureau of the Census for the employment of personnel of Spanish origin or descent and shall submit a report to Congress within one year of the enactment of this Act on the progress of such program.

(MARIA ELENA GONZALEZ, STATISTICAL POLICY DIVISION, OFFICE OF MANAGEMENT AND BUDGET, telephone (202) 395-6132.)

PRESIDENT'S EMPLOYMENT AND TRAINING REPORT

Two hundred years of work in America is featured in the 14th annual *Employment and Training Report of the President* (formerly the Manpower Report of the President). The 404-page report reviews the major labor market developments of 1975, including labor force growth and the impact of the recent recession on employment and unemployment levels and on labor productivity, wages, and earnings. Marking the Nation's Bicentennial celebration, the 1976 edition recounts the ways in which people's needs for real income, security, and psychic satisfaction have been met by work in America over the last 200 years.

In addition, the report reviews the unemployment insurance system—past, present, and future and also

examines the construction industry, describing the composition of building activity and trends in productivity improvements and cost; the construction work force, its compensation, composition, and its labor unions; the industry's labor market, including the criteria for recruitment, development and deployment of workers; equal employment opportunity to promote minority access to jobs; and industry trends.

Further the report covers the first full year of operation under Titles I through VI of the Comprehensive Employment and Training Act (CETA) of 1973. It includes the activities of the National Commission for Manpower Policy during its first year of operation and deals with the Work Incentive (WIN) program, the U.S. Employment Service, and the Bureau of Apprenticeship and Training.

There are two textual appendices to the report: (1) a summary of the current status of the employment security automated systems and the efforts underway to improve computer processing and data gathering, and (2) a report on the incidence of unemployment among offenders. An extensive statistical appendix is also included.

The 1976 *Employment and Training Report of the President* can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The cost per copy is $5.20, Stock No. 029-000-00254-1. (FLORENCE CASEY, EMPLOYMENT AND TRAINING ADMINISTRATION, DEPARTMENT OF LABOR, telephone (202) 376-6620.)

DEMOGRAPHIC ASPECTS OF AGING AND THE OLDER POPULATION

The Bureau of the Census has released a Special Studies report which presents and analyzes data on selected topics pertinent to the understanding of the demographic aspects of aging and the older population in the United States. The prinicipal subjects treated relate to numbers and proportions, age, sex, and race composition, geographic distribution and internal migration, mortality and survival, and certain social and economic characteristics. As an important component of change in the size of the older population, mortality is considered in some detail both historically and prospectively.

This monograph supersedes an earlier publication, *Current Population Reports*, Series P-23, No. 43, "Some Demographic Aspects of Aging in the United States," issued by the Bureau of the Census in February 1973. The present report, which represents a substantial revision of the previous report, gives more recent population and other demographic estimates and projections, an extended historical and prospective analysis, notes on the sources and accuracy of the data, revisions of intercensal estimates of internal migration for States, an amplification of the material on the prospects for increasing longevity and on socioeconomic characteristics, and a selected bibliography.

The following illustrates the range of facts presented in the study. The number of persons 65 years old and over has increased from 3.1 million in 1900 to 22.4 million in 1975 and is expected to reach 31 million by the year 2000. Elderly women (65 years and over) outnumbered elderly men in 1975 by 4.1 million, and the gap is expected to widen to 6.5 milion by the end of the century. Diseases of the heart far outrank any other cause of death among the elderly. Life expectation at birth for females continues to exceed that for males by nearly 8 years, and there is little prospect for any substantial reduction in this gap. The educational attainment of older persons is well below that of U.S. adults in general, but the relative difference will be substantially reduced by the end of the decade. Families with heads 65 years and over have relatively low incomes as compared with all families, but an allowance for the size of family substantially reduces this difference.

Copies of the report, "Demographic Aspects of Aging and the Older Population in the United States," *Current Population Reports*, Series P-23, No. 59 (68 pp., $1.60), are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (JACOB S. SIEGEL, BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, telephone (301) 763-5784.)

1972 ECONOMIC CENSUSES REPORTS

The enterprise statistics program is a statistical byproduct of the Census Bureau's regular economic censuses program. This program involves the regrouping of census data records of establishments under common ownership or control in order to show various economic characteristics of the owing or controlling firms.

Part II of the enterprise statistics program, *Central Administrative Offices and Auxiliaries,* has recently been released by the Bureau of the Census. This report presents data on separately reported central administrative offices and auxiliary units of multiestablishment firms covered in the 1972 Economic Censuses. Data for these special establishments are

distributed by the industry classification of the operating establishments they service, by the type of management or supporting service function they provide, and by their employment size. Data are presented on a selected basis for the geographic divisions, individual states, Standard Metropolitan Statistical Areas, Standard Consolidated Statistical Areas, and some counties.

The report also provides information on the company industry classification, company size, and other economic characteristics of the firms which operate these central offices and auxiliaires. Detailed statistics are provided on sales and receipts, billings to their own retail stores, end-of-year inventories, rental payments, capital expenditures, depreciable assets, and cost of research and development.

Copies of this 75-page report (ES-72-2) may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. (JOHN A. DODDS, BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, telephone (301) 763-7086.)

SUMMARY DATA ON PRESCRIPTION DRUGS FOR 1974

The Office of Research and Statistics, Social Security Administration recently released *Prescription Drug Data Summary, 1974,* which is a report on prescription drug statistics. It updates material contained in the background papers and reports issued by the Department of Health, Education, and Welfare Task Force on Prescription Drugs in 1968 and 1969. The first section of the report indicates the relative importance of out-of-hospital drug expenditures to general health care expenditures and shows how drug expenditures are apportioned among different age groups and what funds are used for the expenditures. The second section presents data on Federal, State, and local government expenditures for prescription drugs, including details by agency and type of program. The third section presents several measures of pharmaceutical industry activity such as domestic and foreign sales of drugs in finished dosage form, research and development expenditures, new drug introductions, and submissions to the Food and Drug Administration and FDA's approvals. The last section contains data on how pharmacists are distributed among different types of practices and the number of prescriptions they dispense.

Single copies of *Prescription Drug Data Summary, 1974* (DHEW Publication No. (SSA) 76-11928) are available from the Publications Staff, Office of Research and Statistics, Social Security Administration, Room 1120 Universal North Building, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009. The report can also be purchased from the Superintendent of Documents, U.S. Government Printing Office, (Stock Number 017-707-00281-1) for $1. (ROBERT ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 382-3261.)

CENSUS BUREAU ISSUES BICENTENNIAL COMPENDIUM OF STATISTICS

A two-part compendium, *Historical Statistics of the United States, Colonial Times to 1970,* was recently issued by the Bureau of the Census, Department of Commerce. This bicentennial edition is a supplement to the annual *Statistical Abstract of the United States* and is the third in a series of volumes inaugurated in 1949. It is far more comprehensive than its predecessors in tracing the social, economic, geographic, and political development of the Nation.

The new edition presents more than 12,500 time series, largely annual, covering various periods from 1610 to 1970. They are organized in 24 chapters and 50 subchapters. Accompanying text cites specific and related sources of information, defines technical terms, and includes discussion of qualifications, development, and reliability of data. A time-period index enables users to identify quickly which time series begin within a specified 10-or 20-year time segment. An alphabetical subject index leads users to the text and tabular pages of their special interests. Data later than 1970 are presented for many of the series in annual issues of the *Statistical Abstract of the United States.* A special historical appendix in each Abstract, beginning with the 1975 edition, links the historical series to specific Abstract tables.

Every chapter in the new edition has undergone some expansion as compared with *Historical Statistics of the United States, Colonial Times of 1957.* Major additions to chapter A, Population, are tables giving population characteristics and land area by States, back to 1790. Chapter F, National Income and Wealth, increased from 345 series to 723, largely due to greater detail for national and personal income to newly-added data on economic growth, valuation of capital stocks, and input-output structure of the economy. The largest increase in series occurred in chapter H, Social Statistics, which grew from 543

series to 1170, reflecting the great public attention given in recent decades to such subjects as social insurance and welfare, education, crime and correction, and recreation. Almost equally large increases occurred in Chapter K, Agriculture, with new series relating to farm population, farm operator characteristics, marketings, government payments and price supports, and new measures of productivity. Substantial increases took place also in Chapter X, Financial Markets and Institutions, due primarily to a new flow-of-funds section.

Several chapters include data series below the National level, that is, for individual States, regions, or other grographic divisions. Of special interest are series on voter participation in presidential elections, by State, and on population censuses taken in the colonies and States during the colonial and pre-Federal period.

All except 76 series given in the last edition are also included in the bicentennial edition. The omissions are primarily discontinued series replaced on recommendation of consultants by similar data, and series considered of marginal importance or questionable validity.

Significant contributions in compilation, coordination, review, and evaluation of the content were received from subject matter experts drawn from Federal agencies, universities, and private research organizations. Their assistance was of immeasurable value to the Census Bureau staff assigned to the project.

Copies of *Historical Statistics of the United States, Colonial Times to 1970* (1968 pp. in two parts, $26.00, cloth) may be purchased from the Assistant Public Printer, Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, or from Department of Commerce district offices, or GPO bookstores located in certain major cities. (WILLIAM LERNER, BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, telephone (301) 763-7024.)

ENVIRONMENTAL QUALITY CONTROL EXPENDITURE AND EMPLOYMENT

Environmental Quality Control—Governmental Finances and Employment: Fiscal Year 1973-74 is the fifth report published by the Bureau of the Census on governmental activity concerning water quality control, solid waste management, and air quality control. The report presents financial (primarily expenditures) and employment data for the Federal Government, the 50 States, the 58 largest counties, and the 48 largest cities according to 1970 Census of Population. Sewerage and other sanitation data are also shown for local governments by State and type of government and for county areas in the 74 major SMSA's.

The study reveals that Federal, State, and local governments spent approximately $7.0 billion during fiscal 1973-74 for the three environmental quality control categories. Water quality control accounted for $4.6 billion, solid waste management $2.0 billion, and air quality control $297.4 million. These same governments employed a full-time equivalent of 225,562 persons in selected environmental quality control activities during October 1974: for water quality control, 93,842 employees; for solid waste management, 124,191 employees; and for air quality control, 7,529 employees.

Persons interested in obtaining copies of this report or additional information regarding it, should address their inquiry to William C. Fanning, Chief, Special Projects Branch, Governments Division, Bureau of the Census, Washington, D.C. 20233. (WILLIAM C. FANNING, BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, telephone (301) 763-7704.)

NATIONAL HEALTH INSURANCE PROPOSALS

As of Februrary 1976, 18 national health insurance bills had been introduced in the 94th Congress. The Social Security Administration's Office of Research and Statistics has compiled a descriptive compendium of these proposals entitled *National Health Insurance Proposals*.

To facilitate comparison of the varied provisions of these 18 bills, this report divides them into four categories: (1) mixed public and private, (2) mainly public, (3) tax credit, and (4) catastrophic protection.

A table lists the bills by name, bill number, first sponsor in the House and Senate, and indicates any announced support by major national organizations. The 210-page report also compares current bills with those introduced in the 93rd Congress.

The provisions of the bills are presented to provide information on the following subjects: General concept and approach; coverage of the population; benefit structure; administration; relationship to other government programs; financing; standards for providers of service; reimbursement of providers of service; and delivery and resources. Many of the bills include provisions designed to change methods of de-

livery of health care services or increase health resources.

Single copies of *National Health Insurance Proposals* are available from the Office of Research and Statistics, Social Security Administration, Room 1120, Universal North Building, Washington, D.C. 20009. It is also for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $2.80. (ROBERT E. ROBINSON, SOCIAL SECURITY ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 382-3261.)

RECENT NSF REPORTS

The National Science Foundation has recently released *Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1974,* second in an annual series. The Foundation has been collecting data from this sector of the economy since 1954.

The following principal characteristics of R&D expenditures are examined in this report: Source of funds; distribution among fields of science; and type of R&D activity (basic research, applied research, and development). Institutions are grouped by highest degree granted, type of control (public, private, etc.), and ranked by total and Federal R&D expenditure size, with subtotals for every 10 institutions. Separate data are summarized for Federally Funded Research and Development Centers (FFRDC) administered by universities and colleges. Also included are separate chapters dealing with capital expenditures and instruction and departmental research in the sciences and engineering.

Other data from the Survey of Scientific Activities of Institutions of Higher Education, FY 1974 published in the advance of the above report were *Science Resources Studies Highlights,* "Separately Budgeted Academic R&D Expenditures Decline in Real Terms in FY 1974," April 21, 1975 (NSF 75-306) and Detailed Statistical Tables, *Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1974* (NSF 75-318), 1975.

Copies of *Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1974* are available from the Superintendent of Documents, U.S. Government Printing Office for $1.15 per copy, stock number 038-000-00270-8.

The following *Science Resources Studies Highlights* have been released: "Academic R&D Spending Up 12 Percent in FY 1975" (NSF 76-307) May 5, 1976 summarizes data from the annual Survey of Scientific and Engineering Expenditures at Universities and Colleges, FY 1975. The data in this *Highlights* represent separately budgeted expenditures for research and development by source of funds, field of science, and type of control of institution. Also shown are the 20 universities reporting the largest amounts of these funds.

"R&D Spending to Top $38 Billion in 1976" (NSF 76-308) May 17, 1976 summarizes the material to appear in early summer in the annual report, *National Patterns of R&D Resources: Funds and Manpower in the United States, 1953-76.*

Copies of *Science Resources Studies Highlights* are available gratis upon request from the Division of Science Resources Studies, National Science Foundation, telephone (202) 282-7714.

The following *Reviews of Data on Science Resources* have been released: "Doctoral Scientists and Engineers in Private Industry, 1973," No. 25, April 1976 (NSF 76-302) is a special analysis of data from the first survey, in a biennial series, of the Doctoral Roster of Scientists and Engineers. This study primarily discusses doctoral scientists and engineers in business and industry by field, primary work activity, industry group, and median annual salaries. There is also a comparison of these individuals with similar scientists and engineers employed in other sectors of the economy.

"Energy and Energy-Related R&D Activities of Federal Installations and Federally Funded Research and Development Centers: Funds, FY 1973-75 (Est.) and Manpower, Jan. 1973-75 (Est.)" No. 26, April 1976 (NSF 76-304) is based upon a survey conducted by the Foundation during mid-1974 and 1975 of Federal agencies which support energy and energy-related research and development carried out in their own installations and in FFRDCs. The data are described in terms of 14 major energy program areas and performers.

Copies of the above *Reviews of Data on Science Resources* are available from the Superintendent of Documents, U.S. Government Printing Office for 35 cents each, stock numbers 038-000-00275-9 and 038-000-00277-5, respectively. (CHARLES E. FALK, DIRECTOR, DIVISION OF SCIENCE RESOURCES STUDIES, NATIONAL SCIENCE FOUNDATION, telephone (202) 282-7714.)

INDIVIDUAL RETIREMENT ACCOUNT AND KEOGH BALANCES

The Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, and the Federal Home Loan Bank Board, each conducted a March 31, 1976 universe survey among the institutions under their jurisdiction on the outstanding volume of Individual Retirement Account (IRA) and Keogh balances held in the form of time and savings deposits. The results of these surveys have been summarized in tabular form by Federal Reserve Districts for commercial banks and mutual savings banks and aggregate totals are summarized for savings and loan associations. In addition, estimates are shown for life insurance IRA and Keogh reserves as of March 31, based on a survey by the Institute of Life Insurance as of December 31, 1975. Similar data are shown for mutual funds, based on surveys by the Investment Company Institute.

Copies of data from the surveys are available on request from the Federal Reserve System, Publications Services. (EDWARD C. ETTIN, DIVISION OF RESEARCH AND STATISTICS, BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, telephone (202) 452-3794.)

RECENT VITAL AND HEALTH STATISTICS

Described below are some of the reports published recently by the National Center for Health Statistics in the vital and health statistics series. Copies of these reports may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. When ordering, please include the DHEW publication number.

Standardized Micro-Data Tape Transcripts (DHEW Publication No. (HRA) 76-1213, 30 pp., 85 cents) is a catalog of the data tapes currently available from NCHS. The catalog describes the approximately 80 data sets available for purchase, lists the contents of each, provides information on format and documentation and includes an order form. Data now available on tape include statistics on health manpower and facilities, health resources utilization, and vital events and data from the National Natality and Mortality Followback Surveys, the Health Interview Survey, and the Health Examination Survey.

Decennial Census Data for Selected Health Occupations: United States, 1970 (DHEW Publication No. (HRA) 76-1231, 93 pp., $1.70) assembles and summarizes selected 1970 Decennial Census data on health manpower from 51 individual publications of the U.S. Bureau of the Census. Of the 441 specific occupational categories used in the 1970 census, 28 are considered health occupations. This report considers the following demographic characteristics of these health practitioners: sex; ethnic composition; patterns of residence; and ratio per 100,000 resident population. Data are presented for the Nation, for States, and for 83 standard metropolitan statistical areas having a population of 250,000 or more as of April 1, 1970.

Series 2 (Data evaluation and methods research):

Quality Control in the Hospital Discharge Survey (No. 68, DHEW publication No. (HRA) 76-1342, 41 pp., $1.50) contains a detailed description of the quality control, process control, and editing techniques employed in the NCHS Hospital Discharge Survey. This survey began in 1964 to collect information on patients discharged from short-stay, noninstitutional, nonfederal hospitals of six beds or more. Detailed data containing such information as the number of hospitals visited in the United States, the number of hospitals rejected for the survey, and the results of retraining coders who make errors are found in 16 tables. Technicals procedures, definitions of some terms and copies of the forms used in data collecting are found in six appendixes.

Series 10 (Data from the Health Interview Survey):

Persons With Impaired Hearing, United States, 1971 (No. 101, DHEW publication No. (HRA) 76-1528, 43 pp., $1.10) is a report presenting estimates of the number of hearing-impaired persons by degree of hearing loss and age of onset distributed by age, sex, place of residence and geographic region, size of family, limitation of activity, telephone in household, family income, years of completed education, race, living arrangements, and usual activity. This report is based on data collected in household interviews during 1971.

Family Out-Of-Pocket Health Expenses, United States, 1970 (No. 103, DHEW Publication No. (HRA) 76-1530, 61 pp., $1.70) presents data on the annual out-of-pocket health expenses of families and unrelated individuals, by type of expense, and intervals of expense, type of family unit, proportion of family units with no expense, and intervals of expense. Total family unit expenses are distributed by race and family income. This report is based on data collected by self-enumeration or personal interview during 1971.

Persons Injured and Disability Days by Detailed Type and Class of Accident, United States, 1971-1972 (No. 105, DHEW Publication No. (HRA) 76-1532,

54 pp., $1.60) is a report on the incidence of persons injured and associated disability days by detailed type and class of accident, place of accident, and selected demographic characteristics. Emphasis in this report is on the detailed type of accident; that is, how the accident happened.

Series 11 (Data from the Health Examination Survey):

Hearing Sensitivity and Related Medical Findings Among Youths 12-17 Years, United States (No. 154, DHEW Publication No. (HRA) 76-1636, 112 pp., $1.80) is a report on the prevalence of ear, nose, and throat abnormalities and the relation of these as well as events in the medical history to hearing sensitivity of youths 12-17 years, by age, sex, race, geographic region, size of place of residence, family income, and education of parent.

Series 13 (Data on health resources utilization):

Inpatient Utilization of Short-Stay Hospitals by Diagnosis, United States, 1972 (No. 20, DHEW Publication No. (HRA) 76-1771, 66 pp., $1.80) presents data on the utilization of non-Federal short-stay hospitals based on statistics abstracted by the Hospital Discharge Survey from a national sample of hospital records of discharged inpatients. The number of discharges, discharge rates, and average length of stay are shown for the classes and categories of first-listed diagnoses, by demographic characteristics of inpatients discharged, and by geographic region and bed size of the hospitals. For these patient and hospital characteristics, this report also presents the number and percent distribution of all-listed diagnoses (up to five diagnoses per patient) reported for inpatients discharged.

Selected Operating and Financial Characteristics of Nursing Homes, United States: 1973-74 National Nursing Home Survey (No. 22, DHEW Publication No. (HRA) 76-1773, 66 pp., $1.80) is a report on the major operating and financial characteristics of nursing homes based on data collected in the 1973-74 National Nursing Home Survey. Data are reported by type of ownership, certification status, size of home, and geographic region.

GBF/DIME CONFERENCE REPORT

This is the seventh report in the series documenting proceedings of various conferences devoted to the discussion of the Bureau of the Census GBF/DIME System. This series serves two major functions; to improve communication among various agencies and organizations assisting the Census Bureau in maintaining the system for their respective areas and to provide a vehicle for the mutual exchange of information and experience in the management and use of the system.

This latest conference was held in San Francisco, California, on October 30 and 31, 1975. The papers presented and the subsequent discussions centered on the theme "GBF/DIME System: A Geographic Dimension for Decisionmaking."

The conference was held in order to acquaint organizations with the uses of the geographic files and the benefits of the GBF/DIME System. The topics focused on the uses being made of the system in the San Francisco Bay Area as well as in a number of other major metropolitan areas. The discussions centered on the application of the system in such fields as transportation, urban planning, law enforcement, and school facility planning. Also included in the program was a presentation describing the Census Bureau's role in the GBF/DIME System in relation to both current and future maintenance activities.

Those agencies and organizations which are dealing with a large volume of addressed data and who are planning on the GBF/DIME System to organize that data into meaningful, understandable, and useable information will find these proceedings extremely valuable since they provide an insight into a few of the many applications of the system as well as an explanation of the Census Bureau's role in the maintenance of the system.

The first two conference proceedings *Use of Address Coding Guides in Geographic Coding—Case Studies*, Report GE 60 No. 1 and *Geographic Base Files-Plans, Progress, Prospects*, Report GE 60 No. 2 are no longer in print.

The proceedings of the last four conferences are as follows:

U.S. Bureau of the Census, *Geographic Base File System—Uses, Maintenance, Problem Solving*, Report GE 60 No. 3, Washington, D.C. 1973 ($1.65);

U.S. Bureau of the Census, *Geographic Base System—Establishing a Continuing Program*, Report GE 60 No. 4, Washington, D.C. 1973 ($1.50);

U.S. Bureau of the Census, *Geographic Base (DIME) File System—A Forward Look*, Report GE 60 No. 5, Washington, D.C. 1974 ($2.00);

U.S. Bureau of the Census, *Geographic Base (DIME) System—A Local Program*, Report GE 60 No. 6, Washington, D.C. 1974 ($1.90).

Copies of these earlier proceedings can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, or from any Department of Commerce district office, except for Report GE 60 No. 5 which is available from the Bureau of the Census, Geography Division, Suitland, Maryland 20233. (BRIAN SWANHART, BUREAU OF THE CENSUS, DEPARTMENT OF COMMERCE, telephone (301) 763-7315.)

STATE AND AREA DATA BOOK

The Bureau of Labor Statistics has released the 12th edition of its State and area data book, *Employment and Earnings, States and Areas, 1939-74*. Historical data on employment, hours, and earnings by industry are shown for the 50 States, the District of Columbia, and 230 metropolitan areas.

Annual averages, adjusted to the latest available benchmarks, are shown from the earliest date of availability for over 8,600 employment series and 3,400 hours and earnings series. Industry definitions are based on the Office of Management and Budget's *Standard Industrial Classification Manual, 1967*. Area definitions and a brief technical description of the data are given in the appendixes.

Copies of *Employment and Earnings, States and Areas, 1939-74*, Bulletin 1370-11 may be purchased for $9.70 per copy from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, or from any of the BLS regional offices. (GLORIA P. GOINGS, BUREAU OF LABOR STATISTICS, DEPARTMENT OF LABOR, telephone (202) 523-1538.)

NEW REPORTING PLANS AND FORMS

The following listing gives brief descriptions of a selected group of new reporting plans and forms approved between May 18 and June 16 by the Office of Management and Budget under the provisions of the Federal Reports Act. The description refers to surveys and data collection programs which are just being started or are soon to be started so results are not yet available.

Department of Agriculture

Economic Research Service

Nitrogenous fertilizer industry survey (singletime).—This project focuses on the characteristics and effects of the dynamic forces affecting the supply of fertilizer at the farm level. The study deals primarily with the nitrogen component of the fertilizer industry with somewhat less detail on potash and phosphate. All U.S. firms producing the major nitrogen fertilizer products will be surveyed to determine: (1) the structural organization of the industry, and (2) the costs involved in manufacturing fertilizer and distributing it through the marketing channel to farmers. (For further information: ROBERT REINSEL, ECONOMIC RESEARCH SERVICE, DEPARTMENT OF AGRICULTURE, telephone (202) 447-4943.)

Department of Commerce

Bureau of the Census

Survey of work history and job search activities of persons not in the labor force (singletime).—This survey is designed to obtain insight into the characteristics and job seeking behavior of discouraged workers and why such persons are not in the labor force. The survey, conducted for the Bureau of Labor Statistics as a supplement to the July and August 1976 Current Population Surveys will obtain new information about the recent work histories and work aspirations of discouraged workers. The information collected will be useful in providing guidelines for the development of a more precise measure of discouraged workers. (For further information: ROBERT STEIN, BUREAU OF LABOR STATISTICS, telephone (202) 523-1530 or B. GREGORY RUSSELL, BUREAU OF THE CENSUS, telephone (301) 763-2773.)

Department of Health, Education, and Welfare

Office of Human Development

Head Start Transition Evaluation Battery.—This fall and in the spring of 1977, the Office of Human Development will conduct a survey of 1800 first-grade schoolchildren and their teachers and parents to determine the extent to which a child's participation in the Head Start Program has benefits in terms of educational achievement and social adjustment which continue after he has left the program or completed it. The study will include children who were eligible for the program but did not participate as well as those who did participate. (For further information: DENNIS DELORIA, OFFICE OF HUMAN DEVELOPMENT, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, telephone (202) 755-7750.)

Department of Transportation

Federal Aviation Administration

Concorde community response (singletime).—On February 4, 1976, the Secretary of Transportation authorized limited operations of the Concorde airplane into JFK and Dulles Airports for a trial period of 16 months. During the trial, the FAA will make detailed measurements and assessments of the environmental effects of the operations of this airplane. This program includes collection of information on the public's subjective response to Concorde flights in the JFK/Dulles areas. This data will be used by the Secretary in conjunction with other information in formulating a decision as to whether to permit continued Concorde operations. (For further information: WILLIAM T. SHEPHERD, FAA, DEPARTMENT OF TRANSPORTATION, telephone (202) 495-9028.)

PROGRESS TOWARD PRESIDENT'S GOALS—OMB INVENTORY OF FEDERAL REPORTS*

Department or Agency	REPETITIVE REPORTS			SINGLE-TIME REPORTS		
	October 31, 1975	May 31, 1976	June 30, 1976	October 31, 1975	May 31, 1976	June 30, 1976
Agriculture	794	742	.....	55	45	.....
Commerce	574	572	.....	88	89	.....
Defense	225	222	.....	14	11	.....
Health, Education and Welfare	958	942	.....	250	259	.....
Housing and Urban Development	299	257	.....	22	24	.....
Interior	328	321	.....	26	26	.....
Justice	166	167	.....	12	13	.....
Labor	267	256	.....	36	16	.....
State	31	32	.....	2	2	.....
Transportation	284	279	.....	47	50	.....
Treasury	138	133	.....	4	6	.....
Agency for International Development	28	28	.....	.....	.....	.....
Energy Research and Development Administration	31	30	.....	1	.....	.....
Environmental Protection Agency	56	57	.....	22	13	.....
Executive Office of the President	14	1	.....	2	1	.....
Farm Credit Administration	1	.....	.....	.....	.....	.....
Federal Home Loan Bank Board	12	12	.....	.....	.....	.....
Federal Mediation and Conciliation Service	5	2	.....	.....	.....	.....
Federal Reserve System	39	34	.....	1	1	.....
Foreign Claims Settlement Commission	1	1	.....	1	.....	.....
National Foundation on Arts and Humanities	20	20	.....	3	5	.....
General Services Administration	68	65	.....	.....	2	.....

PROGRESS TOWARD PRESIDENT'S GOALS—OMB INVENTORY OF FEDERAL REPORTS* (CONTINUED)

Department or Agency	REPETITIVE REPORTS			SINGLE-TIME REPORTS		
	October 31, 1975	May 31, 1976	June 30, 1976	October 31, 1975	May 31, 1976	June 30, 1976
National Aeronautics and Space Administration	23	22	.....	3 1		.....
National Mediation Board	3	3	.....	.....	.....	.....
National Science Foundation	58	54	.....	16	8	.....
ACTION	36	28	.....	10	6	.....
Railroad Retirement Board	122	13	.....	.....	.....	.....
Renegotiation Board	4	4	.....	.....	.....	.....
Selective Service System	24	14	.....	.....	.....	.....
Small Business Administration	20	21	.....	3	1	.....
Smithsonian Institution	11	10	.....	1	.....	.....
Tennessee Valley Authority	22	22	.....	4	5	.....
U.S. Civil Service Commission	151	132	.....	7	4	.....
U.S. Commission on Civil Rights	.....	.....	.....	.....	3	.....
U.S. Information Agency	9	9	.....	.....	.....	.....
U.S. International Trade Commission	6	7	.....	21	20	.....
Veterans Administration	297	274	.....	14	10	.....
National Gallery of Art	3	2	.....	.....	.....	.....
Interim Compliance Panel	2	.....	.....	.....	.....	.....
National Credit Union Administration	6	6	.....	.....	.....	.....
Overseas Private Investment Corporation	1	2	.....	.....	.....	.....
Special Action Office for Drug Abuse Prevention	1	.....	.....	.....	.....	.....
American Revolution Bicentennial Administration	5	5	.....	1	1	.....
Committee on Products and Services of Blind and Severely Handicapped	4	4	.....	1	.....	.....
Community Services Administration	.....	11	.....	.....	1	.....
InterAmerican Foundation	2	2	.....	.....	.....	.....
Pension Benefit Guaranty Corporation	1	1	.....	.....	.....	.....
U.S. Postal Service	3	.....	.....	.....	.....	.....
National Academy of Sciences	.....	.....	.....	7	3	.....
National Center for Productivity	.....	.....	.....	.....	1	.....
National Commission on Libraries and Information Science	.....	.....	.....	.....	1	.....
Administrative Conference of the United States	.....	.....	.....	.....	1	.....
Commission on Review of National Policy Toward Gambling	.....	.....	.....	.....	1	.....
TOTALS	5,153	4,919		674	630	

*Our readers will recall that in April's feature article, "President's Reporting Reduction Program," we stated that we would include this table each month through the period June 30, 1976. This is the progress report for May showing the agencies' progress toward achieving the President's goal of reducing public reporting to Federal agencies.

OTHER REPORTING PLANS AND FORMS

Shown below, by agency, is a list of *new* forms approved between May 18 and June 16 excluding those described above. Questions, requests for additional information about any of the forms, listed below should be addressed in writing to Marsha Traynham, Statistical Policy Division, Office of Management and Budget, Washington, D.C. 20503. Your comments on the usefulness of this feature will be welcomed.

During May approximately 124 forms reached their expiration dates and are no longer approved for use.

DEPARTMENT OF AGRICULTURE

Boundary Waters Canoe Area (BWCA) Use Study

DEPARTMENT OF COMMERCE

Residential Electric Utility Report
1976 Recordkeeping Practices Survey
Reinterview Form for Household Roster's Check (1976 Census of Travis County, Texas)
Birth Expectations and Fertility Supplement—June 1976 Current Population Survey
Criminal Justice Directory Survey
Survey of Local Government Tax Revenues and Intergovernmental Revenues
Steel Castings

DEPARTMENT OF DEFENSE

Packaging, Handling, and Transportability in System/Equipment Acquisition

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Application for Fellowships for Indian Students
School Principal Telephone Interview Protocol
Study of Noise and Hearing in the Paperworking Industry
Instructional Technology and Biomedical Communications Programs in the Health Sciences
Facilities and Occupancy Schedule
Survey/Questionnaire for Budgeting and Accounting
An Assessment of Retention and Recruitment Activities in Health Resources Administration's Special Health Career Opportunity Grants and Special Project Awards
Area Planning and Social Services Program Evaluation-Service Provider Information Form
Intake and Service Summary Program Feedback

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Report on Program Utilization, Section 8 Housing Assistance Payments Program, Existing Housing
Report on Program Utilization Section 8 Housing Assistance Payments Program, New Construction and Substantial Rehabilitation
Authority Preliminary Site Report by Indian Housing
Development Program of Indian Housing Authority

DEPARTMENT OF THE INTERIOR

Private Maintenance of Excess Wild Horse (s) or Burro (s) Application
Bureau of Mines Coal Machinery Survey
Mineral Industry Manpower and Investment Relationship

DEPARTMENT OF LABOR

Weekly Corpsmember Strength Report

DEPARTMENT OF TRANSPORTATION

Authorization to Operate Aircraft in the Vicinity of the Port of New York During Operation Sail 1976
Essential Interstate Segments
Special Notice for Repairs
Guidelines for Submission of Delayed Capital Expenditures

ENVIRONMENTAL PROTECTION AGENCY

Lead Additive Reporting Forms for Refiners Manufacturing Sites
Student Health Study Questionnaire

NATIONAL SCIENCE FOUNDATION

Students Views on Careers

TENNESSEE VALLEY AUTHORITY

Nurse Practitioner Program Feasibility Study

UNITED STATES INTERNATIONAL TRADE COMMISSION

Letter Questionnaire for Importers of Dried Milk Mixtures
Producers' Questionnaire—Acrylic Sheet
Purchasers' Questionnaire—Acrylic Sheet
Importers' Questionnaire—Acrylic Sheet

VETERANS ADMINISTRATION

Reasons for VA Physician and Dentist Separations

COMMISSION ON REVIEW OF NATIONAL POLICY TOWARD GAMBLING

Sports Betting and College Athletics

NATIONAL COMMISSION ON LIBRARIES

Summary of State-Local Financing Systems for Public Libraries

SCHEDULE OF RELEASE DATES FOR PRINCIPAL FEDERAL ECONOMIC INDICATORS

August 1976

Release dates scheduled by agencies responsible for the principal economic indicators of the Federal Government are given below. *These are target dates* that will be met in the majority of cases. *Occasionally agencies may be able to release data a day or so earlier or may be forced by unavoidable compilation problems to release a report one or more days later.*

A similar schedule will be shown here each month covering release dates for the following month. The indicators are identified by the title of the releases in which they are included; the source agency; the release identification number where applicable; and the *Business Conditions Digest* series numbers for all BCD series included, shown in parentheses. Release date information for additional series can be found in publications of the sponsoring agencies.

(Any inquiries about these series should be directed to the issuing agency.)

Date	*Subject*	*Data For*
August 2	Construction Expenditures (Press release), Census, C-30 (69)	June
2	Manufacturers' Shipments, Inventories, and Orders, Census, M3-1 (20, 65, 852)	June
3	Open Market Money Rates and Bond Prices, Federal Reserve Board (FRB), G.13	July 31
4	Manufacturers' Export Sales and Orders, Census, M4-A (506)	June
4	Condition Report of Large Commercial Banks, (FRB) H.4.2 (72)	Week Ending July 28
5	Money Stock Measures, FRB, H. 6 (85, 102, 103	Week Ending July 28
5	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93)	Week Ending August 4
5	Consumer Credit, FRB, G.19 (66, 113)	June
6	The Employment Situation (Press release), Bureau of Labor Statistics (BLS) (40, 41, 42, 43, 44, 740, 841-848)	July
6	Monthly Wholesale Trade (Press release), Census, BW	June
10	Advance Monthly Retail Sales (Press release), Census (54)	July
11	Condition Report of Large Commercial Banks, FRB, H.4.2 (72)	Week Ending August 4
12	Money Stock Measures, FRB, H.6 (85, 102, 103)	Week Ending August 4
12	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93)	Week Ending August 11

Date	Subject	Data For
August 12	Wholesale Price Index (Press release), BLS, (55,58,750,751,752)	July
13	Manufacturing and Trade: Inventories and Sales, Bureau of Economic Analysis (BEA) (31, 56, 71, 851)	June
16	Yields on FHA Insured New Home 30-Year Mortgages, HUD (118)	August 1
16	Industrial Production and Related Data, FRB, G. 12.3 (47, 853)	July
16	Selected Data on International Transactions of the United States (BEA)	2Q'76
17	Housing Starts (Press release), Census, C-20 (28,29)	July
18	Personal Income, BEA (52, 53)	July
18	Condition Report of Large Commercial Banks, FRB, H.4.2. (72)	Week Ending August 11
19	Money Stock Measures, FRB, H.6 (85, 102, 103)	Week Ending August 11
19	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve Banks, FRB, H.4.1 (93)	Week Ending August 18
19	Federal Receipts and Expenditures, NIPA BASIS, BEA (600, 601, 602)	2 Q '76
19	Corporate Profits, BEA (16, 22, 68)	2 Q '76
19	Gross National Product (Revised) BEA (200, 205)	2 Q '76
20	Real Earnings (Press release), BLS (741, 859)	July
20	Consumer Price Index (Press release), BLS (781, 782, 783, 784)	July
20	Advance Report on Durable Goods, Manufacturers Shipments and Orders (Press release), Census, M3-1, (6, 24, 25, 96, 647, 648)	July
24	Average Yields of Long-Term Bonds, Treasury Bulletin (115, 116)	August
25	Condition Report of Large Commercial Banks, FRB, H.4.2 (72)	Week Ending August 18
26	Money Stock Measures, FRB, H.6 (85, 102, 103)	Week Ending August 18
26	Factors Affecting Bank Reserves and Condition Statement of Federal Reserve BAnks, FRB, H.4.1 (93)	Week Ending August 25
26	Export and Import Merchandise Trade, Census, FT-900 (500, 502, 512)	July
27	Work Stoppages (Press release), BLS	July
27	Productivity and Costs in Nonfinancial Corporations, BLS	2 Q '76
27	Advance Business Conditions Digest, BEA: (12, 33, 69, 813, 817)	June
	(5, 10, 17, 45, 59, 62, 810, 811, 814, 815, 816, 820, 825, 830, 853, 860)	July

Date	Subject	Data For
August 30	Labor Turnover in Manufacturing (Press release), BLS (2, 3)	July
30	Defense Indicators, BEA, (625)	July
31	Manufacturers' Shipments, Inventories, and Orders, Census M3-1 (20, 65, 852)	July
31	Agricultural Prices (Agriculture)	Mid-August
31	Food Assistance Programs Results (Agriculture)	July

PERSONNEL NOTE

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of the Secretary: RICHARD C. SIMONSON, formerly Departmental Clearance Officer and a member of the *Statistical Reporter* Editorial Committee, has retired after 36 years of Federal Government service.

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	Ann Winkler (personnel notes)	523-0890
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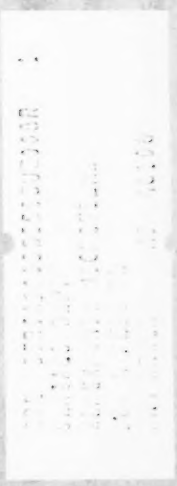

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